INSTRUMENT
CENTER

ēlin DIVISION

CALIFORNIA INSTRUMENTS COMPANY
a division of AIKEN INDUSTRIES, INC.

3511 MIDWAY DRIVE / SAN DIEGO, CA 92110 714-224-3241 CABLE: CALICO SANDIEGO

INSTRUCTION MANUAL

Model 1160 A Elin

Serial _____

INSTRUMENT
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CABINET ASSY. 97204 10

SCHEMATIC H77432 . . . . . .

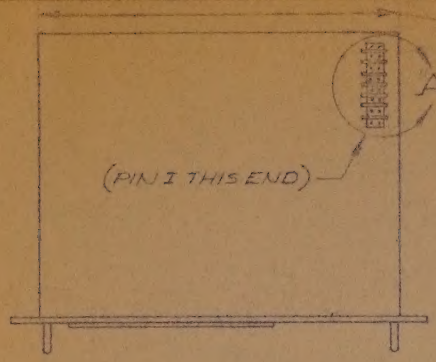
R & C LIST . . . . . 11 & 12

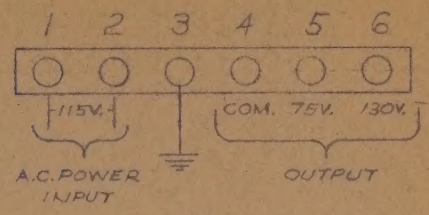
SECTION 5 PLUG-IN UNITS

SPECIFICATIONS
MODEL 1160A WITH STABLE INPUT

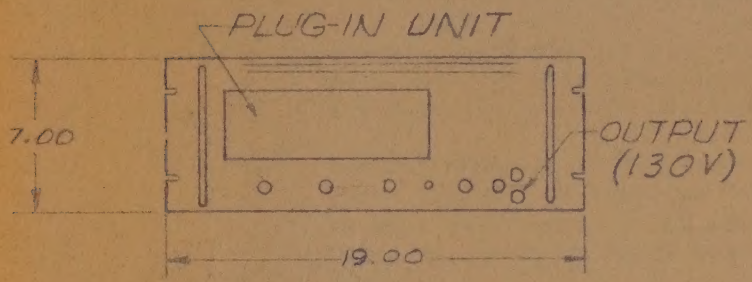
POWER OUTPUT:	160VA
OVERLOAD PROTECTION:	RESETABLE OVERLOAD RELAY REMOVES SIGNAL WHEN UNIT IS OVERLOADED
LOAD POWER FACTOR:	UNITY TO 0.7 PF, LEAD OR LAG
VOLTAGE RANGE:	0 TO 130V CONTINUOUSLY VARIABLE, FULL POWER OUTPUT FROM 105 TO 125V FOR ALL CONDITIONS OF LINE AND LOAD. (SEE CHART A116 FOR POWER OUTPUT DERATING)
LOAD REGULATION: (RESISTIVE LOAD ONLY)	LESS THAN 1%, NO-LOAD TO FULL-LOAD, FROM 45 CPS TO 5000 CPS MAY BE ADJUSTED TO ZERO, NL TO FL, FOR A GIVEN SET OF LOAD & LINE CONDITIONS (CONTROL RESOLUTION .02%)
RECOVERY TIME:	ZERO (OUTPUT AMPLITUDE NEVER EXCEEDS THE 1% LOAD REGULATION SPEC)
AMPLITUDE REGULATION VS. LINE:	LESS THAN ± 0.25% FOR 115V ± 5V LESS THAN ± 0.5% FOR 115V ± 10V
FREQUENCY RANGE:	45 CPS TO 5000 CPS AT FULL POWER; TO 10,000 CPS AT HALF POWER OUTPUT
TOTAL HARMONIC DISTORTION: (RESISTIVE LOAD ONLY)	ADDS LESS THAN 1%, ALL CONDITIONS OF LINE & LOAD, FROM 45 TO 5000 CPS; TO 10,000 CPS AT HALF POWER OUTPUT
INPUT POWER:	115V ± 10V, 60 CPS, 600 WATTS MAX.
SHORT CIRCUIT PROTECTION:	THERMAL CIRCUIT BREAKER PROTECTS POWER CIRCUIT.

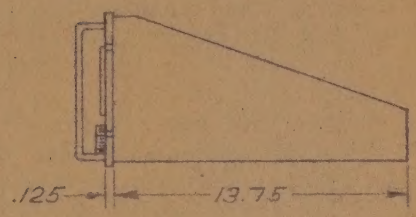
RACK MODEL





DETAIL "A"



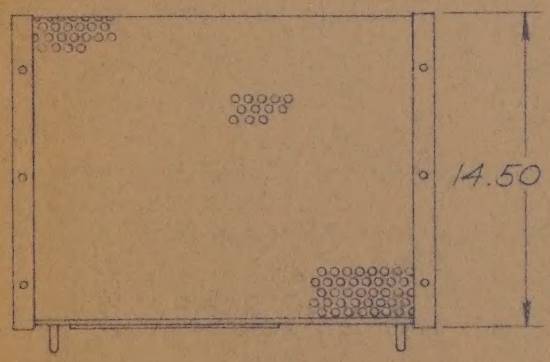


EXCLUDING CONNECTORS

NOTES:

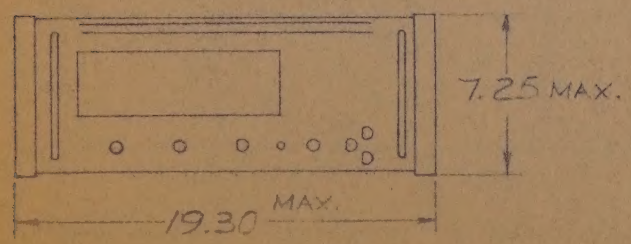
4. RUBBER FEET (NOT SHOWN) SUPPLIED ON BOTH RACK AND CABINET MODELS.
3. PANEL PER RETMA STANDARDS.
2. PANEL PAINTED LT. GRAY NO. 26440 PER-FED-STD-595 WITH BLACK MARKING.
1. APPROXIMATE WEIGHT = 50 LBS. (WITHOUT PLUG-IN UNIT)

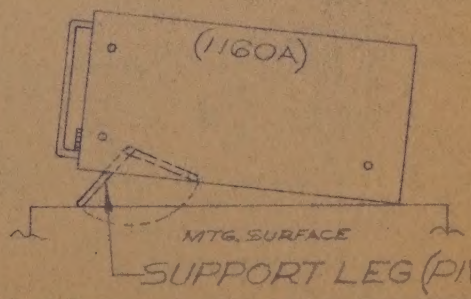
CABINET MODEL



1. ENCLOSURE COLOR: TEXTURED BLUE
2. PANEL SAME AS RACK MODEL.

NOTES:





	NAME	DATE	SPECIFICATIONS	elin DIVISION INTERNATIONAL ELECTRONIC RESEARCH CORPORATION
DRAWN BY	J.E.S.	10-15-64		
APPROVED	[illegible]	10-16-64	MODEL 1160A	
APPROVED	[illegible]	10/16/64	PAGE 1 OF 3	DRAWING NO. A86432A

SECTION 1

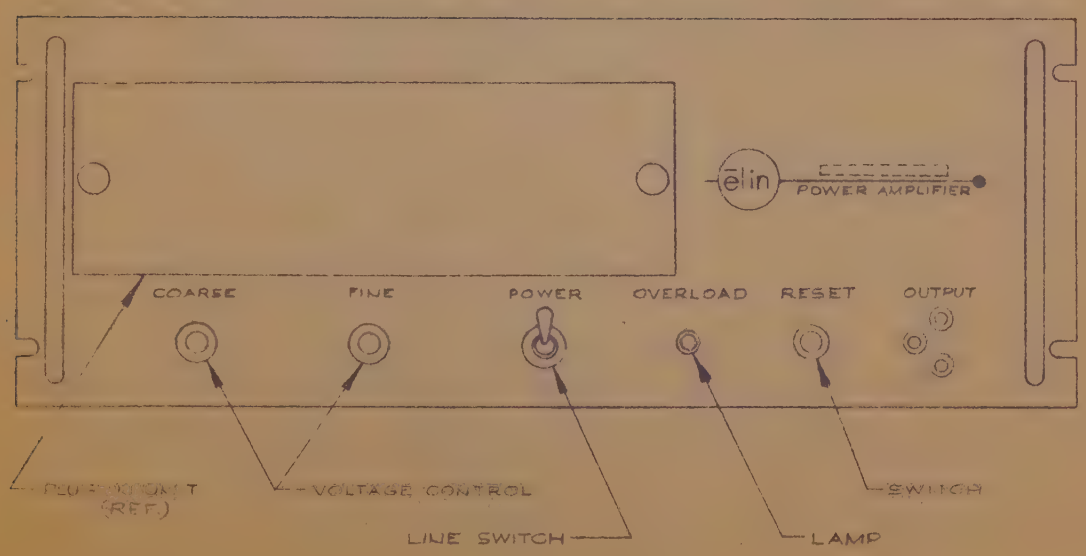
1.0 CONTROLS (REFER TO DWG. BELOW)

1.0.1 VOLTAGE CONTROLS: ADJUST OUTPUT VOLTAGE LEVEL. WHEN USING MODEL 1160 WITH EXTERNAL INPUT, SET INPUT LEVEL AT 10V RMS AND THEN USE THE 1160 VOLTAGE CONTROLS.

1.0.2 CIRCUIT BREAKER: TURNS INSTRUMENT ON AND OFF AND PROTECTS POWER CIRCUIT. A POWER ON INDICATOR LAMP IS MOUNTED ON THE PLUG-IN UNIT PANEL IN ALL PLUG-IN UNITS EXCEPT THE VARIABLE FREQUENCY UNIT, IN WHICH CASE THE DECIMAL POINT LIGHTS ARE USED.

1.0.3 OVERLOAD INDICATOR: LIGHTS WHEN UNIT IS OVERLOADED.

1.0.4 RESET SWITCH: RETURNS UNIT TO NORMAL OPERATION AFTER AN OVERLOAD.



ADDENDUM

THE MODEL 1160A INCORPORATES AN OVERLOAD PROTECTION CIRCUIT WHICH, WHEN ACTIVATED, GROUNDS OUT THE INPUT SIGNAL TO THE AMPLIFIER THUS PREVENTING DAMAGE TO THE AMPLIFIER CAUSED BY ACCIDENTAL OVERLOAD OR SHORT CIRCUIT AT THE OUTPUT.

THE OVERLOAD CIRCUIT SENSES OUTPUT TUBE PLATE CURRENT. IF THE PLATE CURRENT REACHES APPROXIMATELY 150 MA PER TUBE, A RELAY WILL BE ACTIVATED WHICH DISSABLES THE INPUT SIGNAL, TURNS ON THE "OVERLOAD" LAMP AND CLOSES A RELAY LATCHING CIRCUIT.

AN OVER CURRENT THRESHOLD CONTROL MOUNTED INSIDE THE 1160A IS FACTORY SET, AND FUTURE ADJUSTMENT OF THIS CONTROL WILL NOT NORMALLY BE REQUIRED.

A "RESET" BUTTON IS LOCATED ON THE FRONT PANEL OF THE 1160A. THE FUNCTION OF THIS BUTTON IS TO OPEN THE LATCHING CIRCUIT WHEN THE OVERLOAD RELAY HAS BEEN ACTIVATED. IT IS ADVISABLE TO TURN DOWN THE FRONT PANEL "COARSE" CONTROL PRIOR TO PUSHING THE "RESET" BUTTON. THIS WILL PREVENT THE UNIT FROM GOING INTO OVERLOAD AGAIN, PROVIDING THE CAUSE OF THE OVERLOAD HAS BEEN REMOVED.

NOTE: THE "OVERLOAD" LAMP MAY LIGHT WHEN THE 1160A IS FIRST TURNED ON. THIS IS CAUSED BY THE WARM UP CHARACTERISTICS OF THE UNIT. DEPRESSING THE "RESET" BUTTON WILL RETURN THE UNIT TO ITS NORMAL OPERATING CONDITION.

SECTION 2

2.0 INTRODUCTION

The 1160 is many AC power sources in one. It is a basic regulated, wide band amplifier with interchangeable plug-in modules for a wide range of AC power applications. Precision oscillators, variable and fixed frequency oscillators, frequency standard oscillators and a basic unit for external input are available as standard plug-in modules. Special plug-in configurations can be supplied to customer requirements.

2.1 UNPACKING AND MECHANICAL INSPECTION

Inspect instrument for shipping damage as soon as it is unpacked. Visually inspect the instrument for broken knobs, connectors or any other signs of physical damage. Rotate controls and switches for smoothness of operation. Binding or jamming indicates defective mechanical operation. If a control is found that does not turn freely, do not force it for such action may cause serious damage. Upon satisfactory visual inspection, check the electrical performance of the instrument. If instrument is defective, see the warranty on the cover sheet.

2.2 ELECTRICAL CONNECTIONS

The National Electrical Manufacturers' Association (NEMA) recommends that the instrument panel and its case be grounded for safety of operation. All Ēlin Model 1160's supplied with cabinets include a three-conductor power cable which, when plugged into an appropriate receptacle, grounds the instrument. The ground pin on the power cable, three-prong connector is the offset round pin. When operating the instrument from a two-contact outlet, use a three-prong to two-prong adapter and connect the green pigtail on the adapter to ground.

NOTE: Rubber bumpers are provided on all models to allow for ventilation. They can easily be removed, if necessary, for rack installation.

2.3 GENERAL OPERATING INFORMATION

INPUT POWER: TO INSURE MAXIMUM STABILITY VERSUS VARYING LINE CONDITIONS, THE CRITICAL VOLTAGES IN THE 1160 ARE REGULATED. THE LINE VOLTAGE MAY VARY BETWEEN 105 AND 125V WITHOUT NOTICEABLY AFFECTING THE PERFORMANCE OF THIS INSTRUMENT. A THERMAL CIRCUIT BREAKER PROTECTS PRIMARY POWER CIRCUITS.

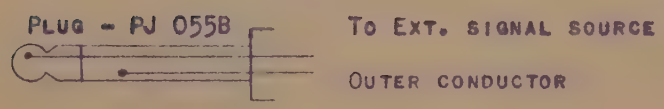
OUTPUT: THE OUTPUT OF THE 1160 APPEARS AT THE BINDING POSTS ON THE FRONT PANEL AND AT A TERMINAL BLOCK MOUNTED ON THE REAR OF THE 1160 CHASSIS. A RESETABLE OVERLOAD RELAY REMOVES SIGNAL WHEN UNIT IS OVERLOADED.

THE OUTPUT OF THE 1160 IS COMPLETELY FLOATING. IF NECESSARY, EITHER SIDE MAY BE GROUNDED.

NOTE: TURN THE VOLTAGE CONTROLS TO THE MAXIMUM COUNTER-CLOCKWISE POSITION BEFORE TURNING THE INSTRUMENT ON OR BEFORE CHANGING PLUG-IN UNITS.

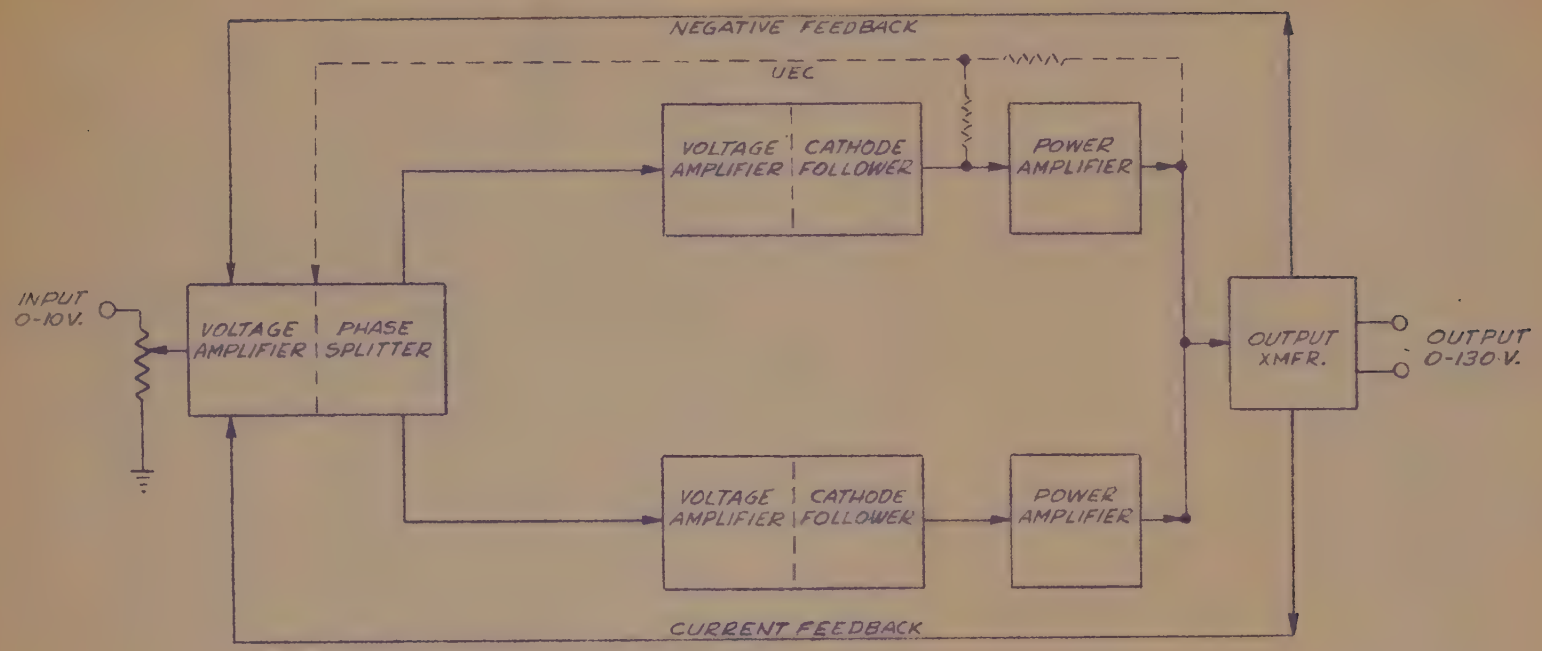
ALLOW TWO MINUTES' WARM-UP BEFORE TURNING UP THE SIGNAL.

EXTERNAL INPUT: ALL PLUG-IN UNITS EXCEPT THE VARIABLE FREQUENCY (ALO) PLUG-IN UNIT AND CUSTOM BUILT PLUG-IN UNITS ARE EQUIPPED WITH EXTERNAL INPUT JACKS. THESE JACKS AUTOMATICALLY DEFEAT THE INTERNAL SIGNAL SOURCE. THE 1160 WILL WORK WITH ANY EXTERNAL SIGNAL SOURCE OF THE CORRECT FREQUENCY RANGE THAT WILL PROVIDE AT LEAST 10V RMS INTO A 25 K OHM LOAD. SEE THE DIAGRAM BELOW FOR HOOKUP OF EXTERNAL INPUT.



NOTE: WHEN RACK INSTALLING THE 1160, PROVIDE EITHER SLIDES OR GUIDE RAILS. DO NOT ATTEMPT TO FRONT-PANEL MOUNT THIS UNIT.

BLOCK DIAGRAM



L 1160A
A117

SECTION 3

3.0 POWER AMPLIFIER SECTION

THE POWER AMPLIFIER SECTION OF THE 1160 IS PRESENTED IN BLOCK DIAGRAM FORM ON DWG. A117. IN REFERRING TO THIS DIAGRAM, NOTE THAT THE BASIC FORMAT IS THAT OF A CONVENTIONAL POWER AMPLIFIER. THE CATHODE FOLLOWERS THAT DRIVE THE 93500 OUTPUT TUBES ALLOW THE DRIVER STAGES TO BE DIRECT-COUPLED TO THE 93500'S. THIS IS ADVANTAGEOUS FROM A FREQUENCY RESPONSE STANDPOINT.

INVERSE VOLTAGE (NEGATIVE FEEDBACK) IS UTILIZED IN THE CONVENTIONAL MANNER. AN ADDITIONAL CONTROL LOOP DESIGNATED AS "UEC", WHICH STANDS FOR "UNITY ERROR CORRECTION", SENSES THE SOMEWHAT ABERRATED SIGNALS THAT APPEAR ON THE PLATES OF THE POWER OUTPUT TUBES AND COMPARES THESE SIGNALS WITH THE PURER GRID DRIVE SIGNALS. THE DIFFERENCE BETWEEN THESE SIGNALS, OR WHAT MAY BE CALLED AN ERROR SIGNAL, IS THEN FED BACK INTO ONE OF THE PRE-AMPLIFIER STAGES, 180° OUT OF PHASE, AT A PRE-DETERMINED RATIO.

"UEC" HAS MANY INTERESTING CHARACTERISTICS. SOME OF THEM ARE AS LISTED BELOW:

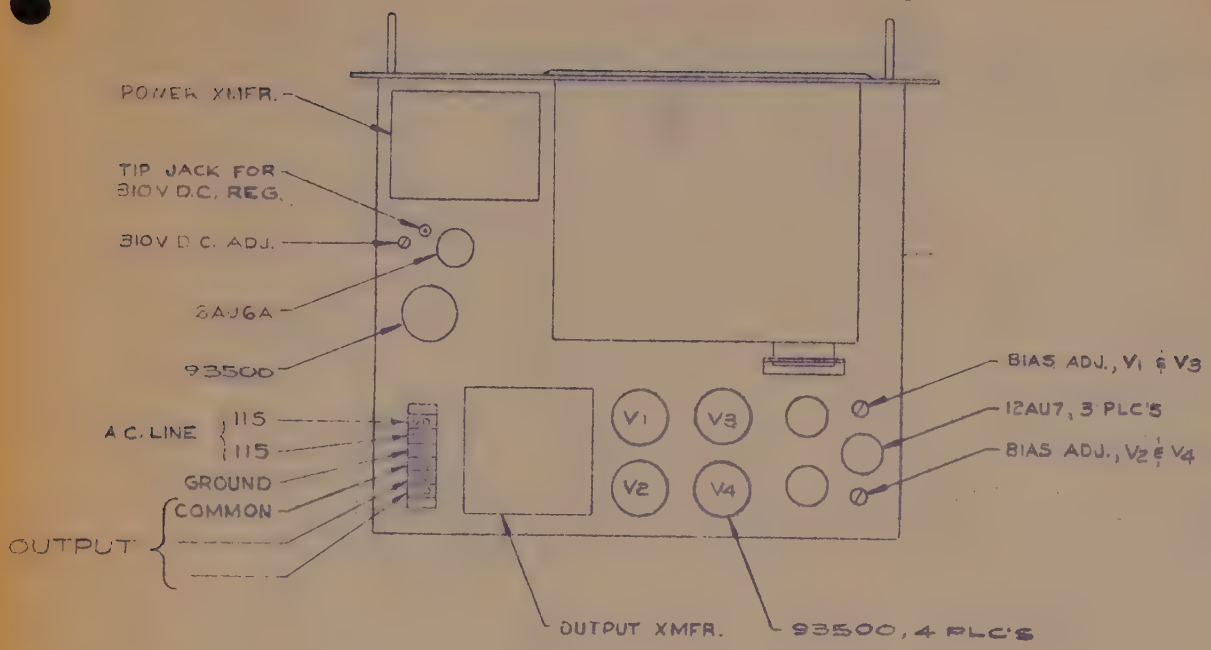
1. MINIMIZATION OF DISTORTION IN THE POWER OUTPUT STAGE.
2. AMPLITUDE STABILIZATION VERSUS VARYING LINE.
3. AMPLITUDE STABILIZATION VERSUS LOAD.

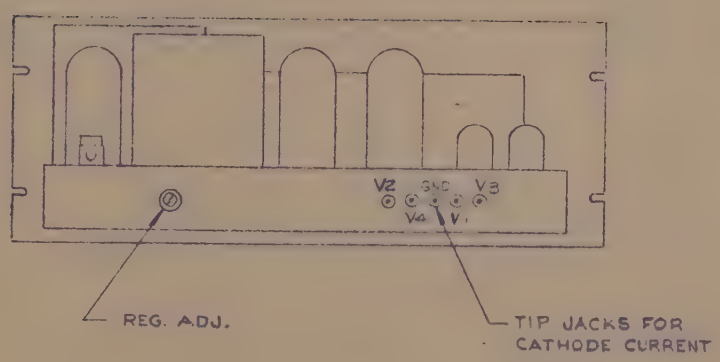
IT IS INTERESTING TO NOTE THAT BY STABILIZING THE TOTAL FORWARD LOOP GAIN OF THE AMPLIFIER, NEGATIVE FEEDBACK DOES NOT HAVE TO BE DECREASED TO ALLOW FOR THE 6DB CHANGE IN THE NO-LOAD TO FULL-LOAD GAIN OF THE AMPLIFIER. LOOKING AT THE TOTAL POWER AMPLIFIER AS A SYSTEM, "UEC" HAS A "FIGURE OF MERIT" OF BETWEEN 4 AND 5.

LOAD REGULATION CIRCUITRY, UTILIZING COMMON CURRENT SENSOR TECHNIQUES, WAS NOT ADEQUATE BECAUSE OF A THERMAL DRIFT PROBLEM. TO COMPENSATE FOR THIS, A RATHER UNIQUE SENSING SYSTEM WAS DEVISED UTILIZING THE RESISTANCE OF THE OUTPUT TRANSFORMER WINDING AS THE SENSE ELEMENT. SINCE A BULK OF THE THERMAL DRIFT IN A POWER AMPLIFIER CAN BE ATTRIBUTED TO THE CHANGES IN RESISTANCE OF THE OUTPUT TRANSFORMER WINDING, UTILIZATION OF THIS WINDING AS A SENSOR CREATES A SELF-COMPENSATING LOAD REGULATION CIRCUIT. YOU WILL NOTE ON THE BLOCK DIAGRAM THAT THIS "CURRENT FEEDBACK" IS SUMMED WITH THE NEGATIVE FEEDBACK, RESULTING IN CONSTANT VOLTAGE VERSUS LOAD.

3.1 POWER SUPPLY

THE DC POWER SUPPLY SECTION OF THE 1160 CONSISTS OF A FULL WAVE VOLTAGE DOUBLER AND A SERIES REGULATOR FOR THE CRITICAL VOLTAGES. THIS ELECTRONIC REGULATOR IS MADE UP OF A 93500 PASS TUBE AND A ZENER DIODE REFERENCED CONTROL UNIT, ELIN ASSEMBLY NO. 96027. USE OF REGULATED VOLTAGES MINIMIZES THE EFFECTS OF LINE VARIATIONS ON THE INSTRUMENT.





COMPONENT LOCATION DRAWING FOR MODEL 1160

SECTION 4 CALIBRATION, MAINTENANCE & TROUBLE SHOOTING INFORMATION

4.0 CALIBRATION

Allow a three hour warm-up before checking calibration. There are a minimum number of adjustments that can be made on the 1160. Referring to Dwg. A118, adjustments should be set up as follows:

4.0.1 The DC 310 volt adjustment should be set at 310V. This can be monitored by a 20 K Ohm per volt VOM at the TIP jack provided.

4.0.2 The cathode bias adjusts should be set for the approximate 0.4V as monitored on the TIP jacks provided on the rear apron of the chassis. Set the cathode current with the amplifier in a no-load, no-signal condition.

4.0.3 The load regulation adjustment should be attempted only after Steps 4.0.1 and 4.0.2 have been completed. It is recommended that an AC differential or digital voltmeter of adequate resolution be used. The load regulation should be set to zero percentage deviation, no-load to full-load at 1KC with a 160W resistive load at 115V output. If desired, the regulation can be set to a given load for a specific application. If this is done, the general load specifications of this instrument no longer apply.

4.1 MAINTENANCE

Due to conservative rating of components, there should be very little maintenance required by the 1160. If failure occurs, a systematic approach to the problem should be followed. The trouble shooting information presented in this section is for the use of personnel thoroughly versed in trouble shooting procedures and the circuit theory given in Section 3.

4.1.1 The circuit breaker located on the front panel should be checked.

4.1.2 Measure the alternating current supplied to the power transformer to insure that the input voltage is within the range of 105 to 125V RMS, 50 to 60 CPS.

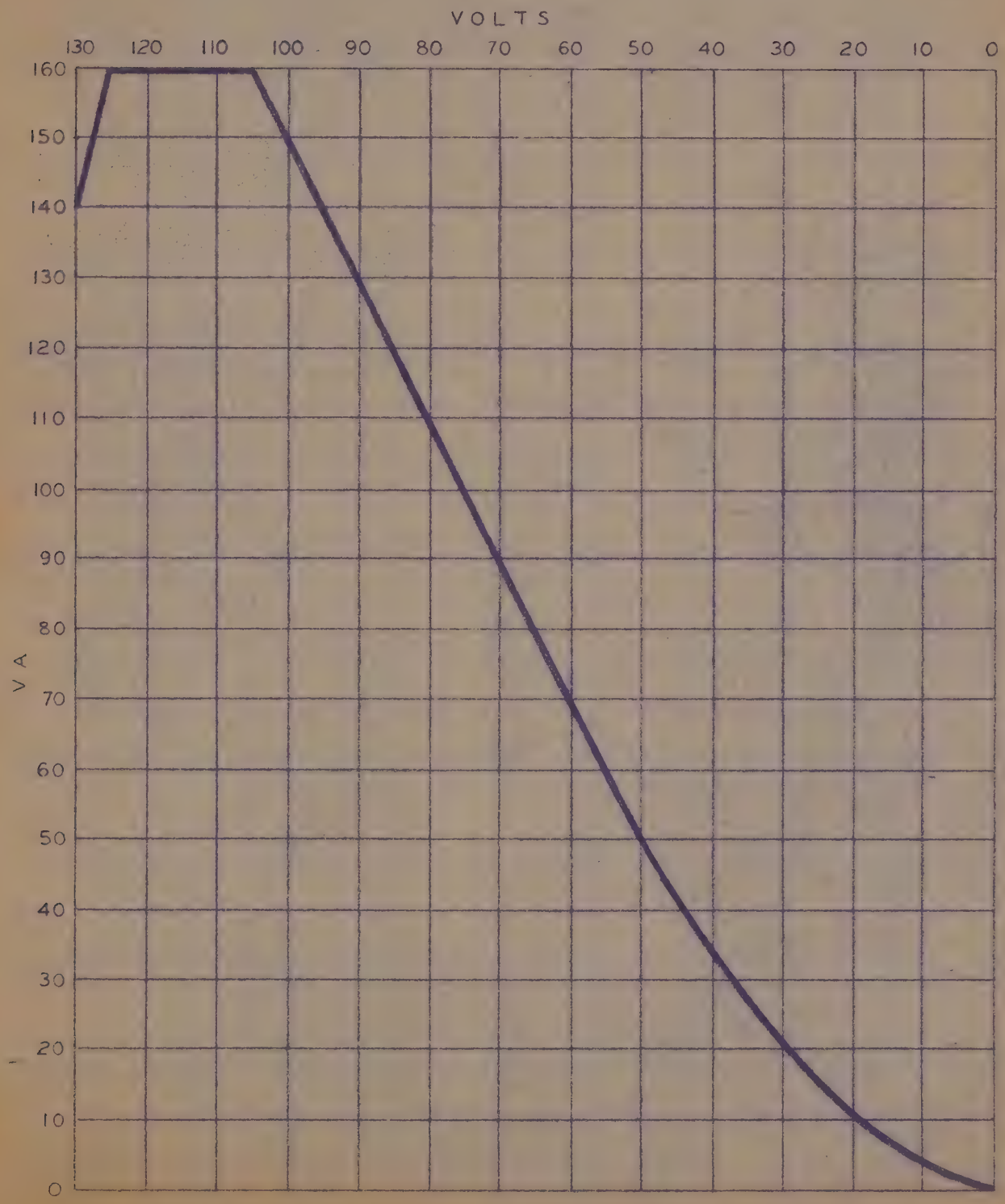
4.1.3 Check the tubes by direct substitution.

4.1.4 DC voltage measurements should be made to determine if all voltages are correct. The pertinent voltages are noted on the schematic. It is normal for these voltages to vary ± 10% from the designated value. All measurements must be made with a vacuum tube voltmeter.

4.1.5 Standard signal tracing procedures can be used with this instrument. Use a scope with a high impedance probe to prevent signal loading.

4.1.6 Distortion may be measured with an instrument which directly indicates percentage of total harmonic distortion, such as a Hewlett-Packard Model 330B.

DERATING OF POWER OUTPUT vs. VOLTAGE



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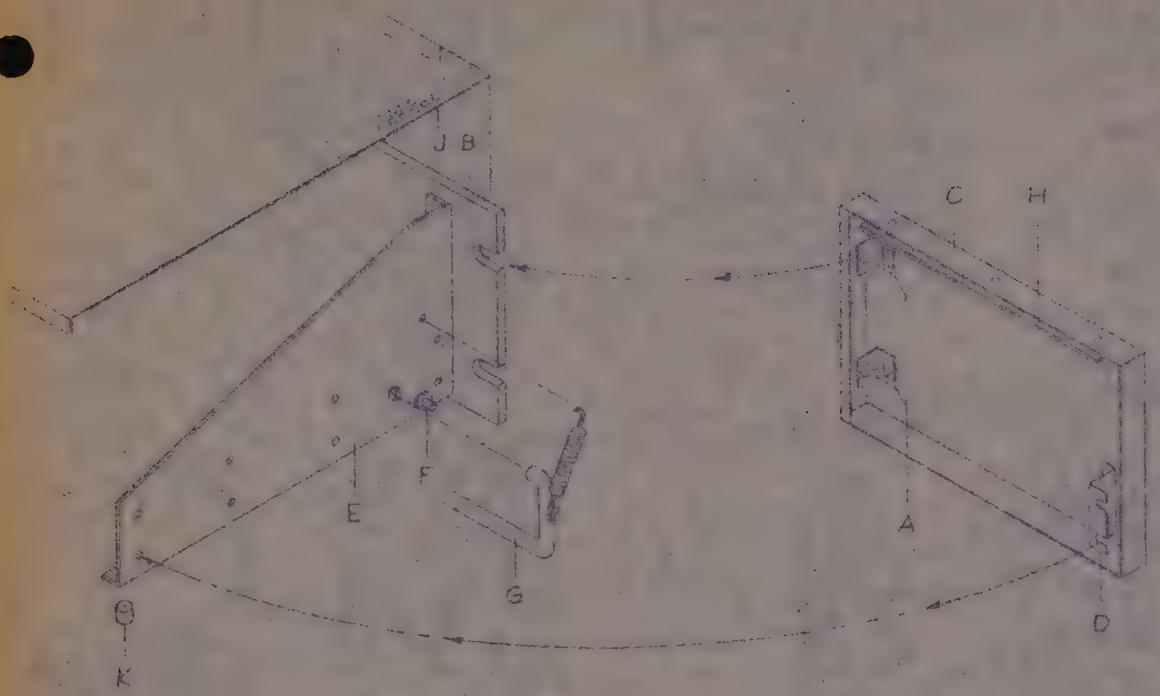


PERFORM THE FOLLOWING STEPS ON BOTH SIDES OF THE UNIT:

1. REMOVE BOTTOM PERFORATED COVER (NOT SHOWN).

2. REMOVE BRACKETS "A" FROM END PIECE "C" AND INSTALL ON FRONT PANEL "H" USING SCREW, NUT AND WASHERS THAT ARE PROVIDED.

3. REMOVE BRACKET "B" FROM END PIECE "C" AND INSTALL AT REAR OF CHASSIS SIDE PLATE "E".

4. INSTALL 8-32 X 3/8 SCREW "F" FROM THE INSIDE OUT. THIS ACTS AS A STOP FOR THE PIVOT LEG "G".

5. FIT PIVOT LEG "G" INTO HOLE AND ATTACH SPRING AS SHOWN.

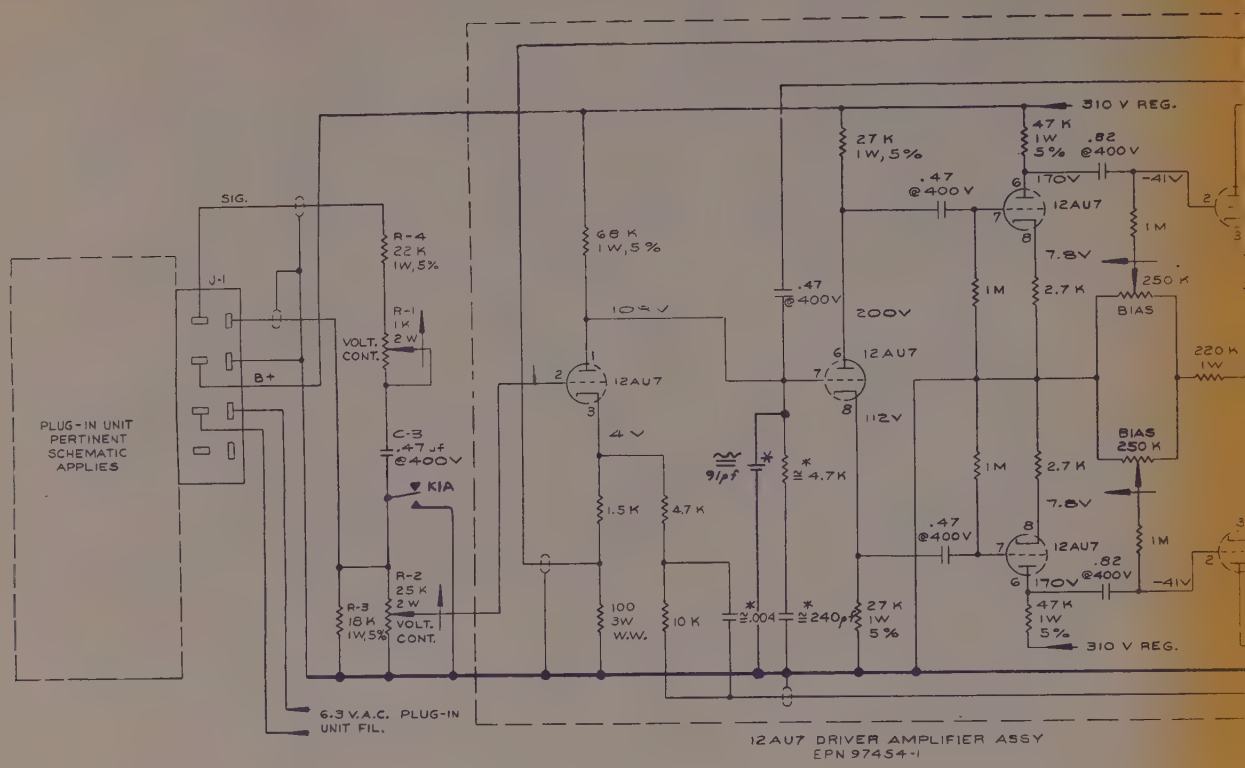
6. LOOSEN STRIP "H". DO NOT DETACH IT COMPLETELY.

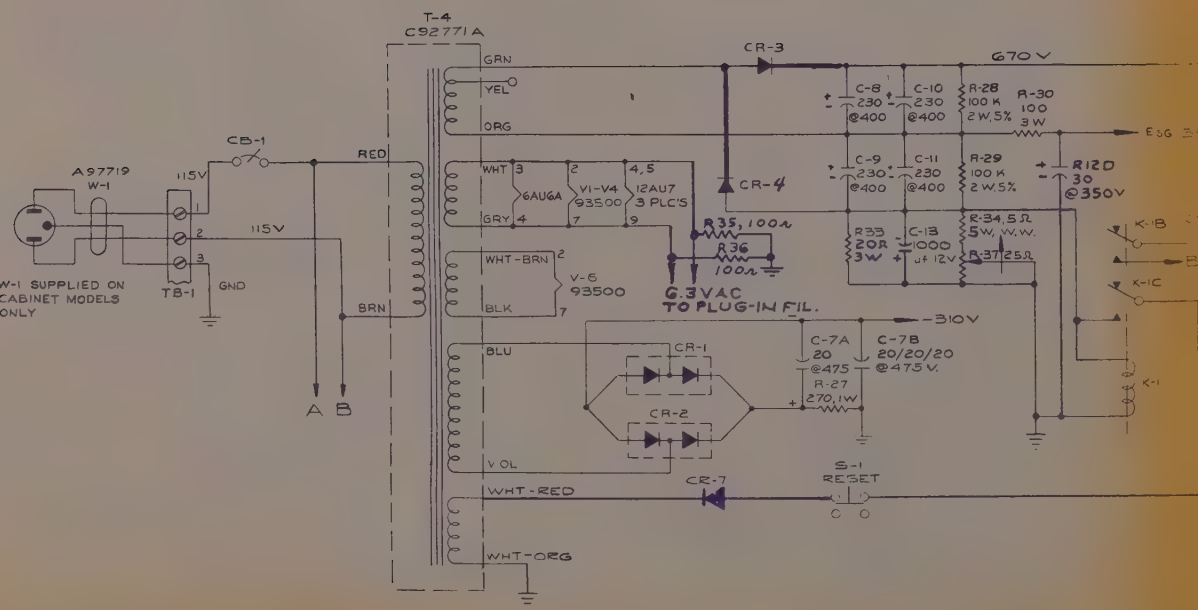
7. AS END PIECE "C" IS BEING FITTED TO BRACKETS "A" & "B", PLACE TOP SCREEN "J" BETWEEN STRIP "H" AND TOP FLANGE OF END PIECE "C".

8. SECURE END PIECE "C" TO BRACKETS "A" & "B" WITH GRAY PHILLIPS HEAD SCREWS.

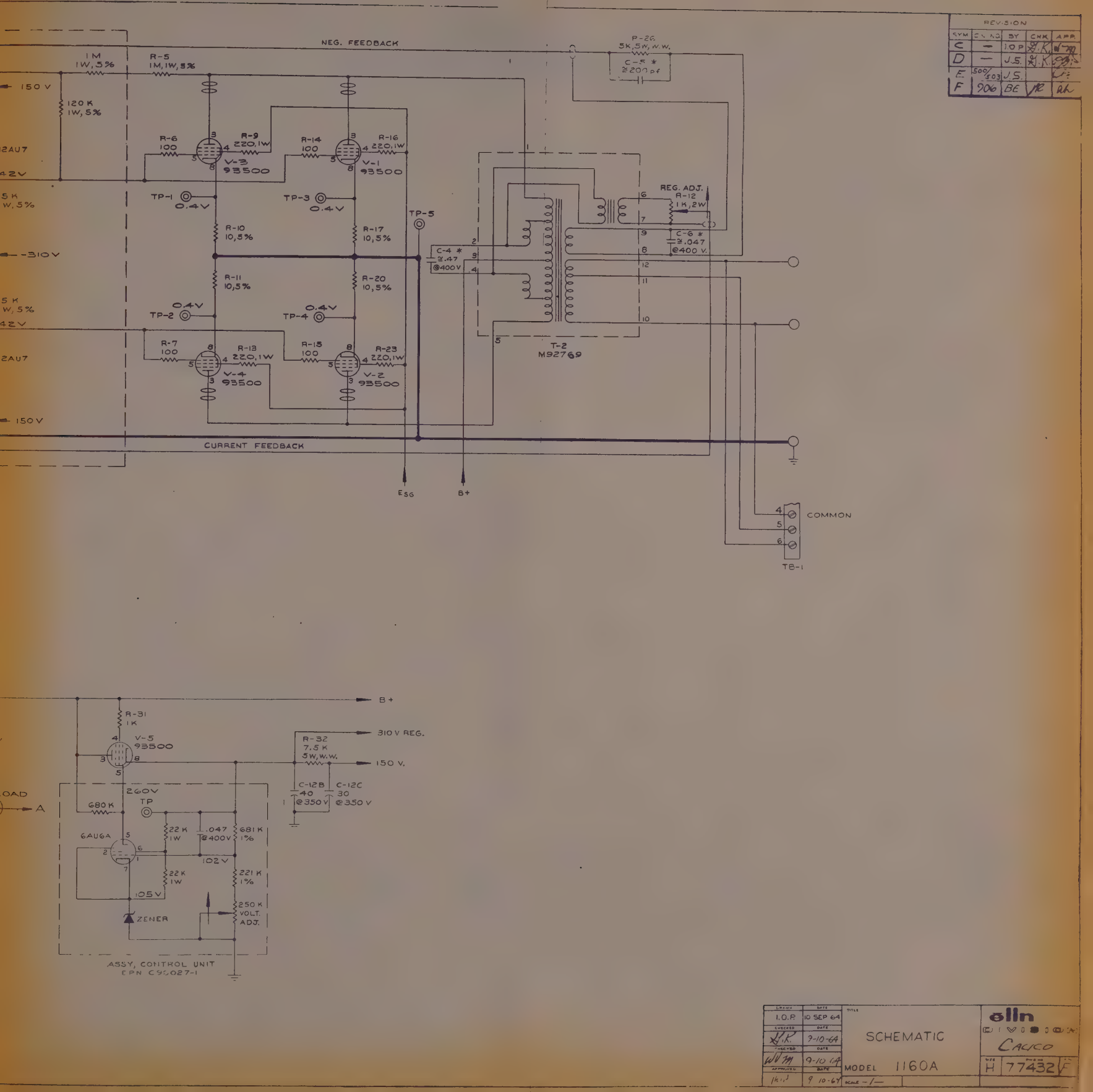
9. TIGHTEN DOWN PHILLIPS SCREWS ON TOP OF END PIECE "C". THIS WILL HOLD THE TOP SCREEN "J" INTO PLACE.

10. REPLACE BOTTOM PERFORATED COVER. INSTALL RUBBER FEET "K" AT THE FOUR CORNERS.





1. SEE SPEC SHEET FOR FURTHER INFORMATION.
3. COMPONENTS DENOTED "*" ARE FACTORY SELECTED.
2. ALL CAPACITORS ARE SHOWN IN MICROFARADS.
. ALL RESISTORS ARE 1/2 W, ± 10% AND SHOWN IN OHMS.
'ES (UNLESS OTHERWISE SPECIFIED)



REVISION
SYM | CH. NO. | BY | CHK | APP.
C | — | I.O.P. | G.K. | [illegible]
D | — | J.S. | G.K. | [illegible]
E | 500/503 | J.S. | [illegible]
F | 906 | BE | [illegible] | [illegible]
NEG. FEEDBACK
CURRENT FEEDBACK
150 V
-310 V
1 M 1W, 5%
R-5 1M, 1W, 5%
120 K 1W, 5%
R-6 100
R-9 220, 1W
V-3 93500
R-14 100
R-16 220, 1W
V-1 93500
TP-1 0.4V
TP-3 0.4V
TP-5
R-10 10, 5%
R-17 10, 5%
R-11 10, 5%
R-20 10, 5%
TP-2 0.4V
TP-4 0.4V
R-7 100
R-13 220, 1W
V-4 93500
R-15 100
R-23 220, 1W
V-2 93500
C-4 * ≅.47 @400V
REG. ADJ. R-12 1K, 2W
C-6 * ≅.047 @400 V.
T-2 M92769
R-26 5K, 5W, W.W.
C-5 * ≅200 pf
ESG
B+
COMMON
TB-1
B+
R-31 1K
V-5 93500
R-32 7.5 K 5W, W.W.
310 V REG.
150 V.
C-12B 40 @350 V
C-12C 30 @350 V
260V
TP
680 K
6AU6A
22 K 1W
.047 @400V
681 K 1%
102 V
22 K 1W
221 K 1%
105 V
ZENER
250 K VOLT. ADJ.
ASSY, CONTROL UNIT
EPN C95027-1
DRAWN I.O.P. DATE 10 SEP 64
CHECKED G.K. DATE 9-10-64
CHECKED [illegible] DATE 9-10-64
APPROVED [illegible] DATE 9-10-64
TITLE SCHEMATIC
MODEL 1160A
SCALE -/-
elln DIVISION CALICO
SIZE H
DWG NO. 77432
REV F

BILL OF MATERIALS

MODEL NO. 1160A | TITLE: POWER AMPLIFIER | DWG A98051C | PAGE 1 OF 4

BY M.K.

APP.

IERC — ēlin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS
PROD. REL: STK. REL.
APP. COMPL.

ITEM	REFERENCE DES.	QTY.	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
1		Ref.	A86432	SPECIFICATION	A86432	INSTRUMENTATION				
2		Ref.	B77432	SCHEMATIC	B77432	INSTRUMENTATION				
3										
4		1	D11299	FRONT PANEL PER D64433	D11299	INSTRUMENTATION				
5		1	D25630	CHASSIS	D25630	INSTRUMENTATION				
6		1	B16053	BRACKET	B16053	INSTRUMENTATION				
7		1	A16052	BRACKET	A16052	INSTRUMENTATION				
8		2	A16083	BRACKET	A16083	INSTRUMENTATION				
9		1	A16115	BRACKET, POT	A16115	INSTRUMENTATION				
10		1	C34029	COVER	C34029	INSTRUMENTATION				
11		1	C67095	PLATE	C67095	INSTRUMENTATION				
12		1	C67096-1	PLATE, SIDE, R.H.	C67096-1	INSTRUMENTATION				
13		1	C67096-2	PLATE, SIDE, L.H.	C67096-2	INSTRUMENTATION				
14		1	[illegible]	[illegible]	[illegible]	[illegible]				
15		1	C96027-1	ASSY, D.C. CONTROL	C96027-1	INSTRUMENTATION				
16		1	97454-1	ASSY, DRIVER AMPLIFIER	97454-1	INSTRUMENTATION				
17										
18	T2	1	M92769	TRANSFORMER, OUTPUT	M92769	INSTRUMENTATION				
19	T4	1	C92771B	TRANSFORMER, POWER	C92771B	INSTRUMENTATION				
20										
21	C7	1	21001	CAPACITOR, ELECTROLYTIC 20-20-20-20 @ 475v.	TVL 4834	SPRAGUE				

BILL OF MATERIALS

MODEL NO 1160A | TITLE POWER AMPLIFIER | DWG. A98051C | PAGE 2 OF 4

BY _____ APP _____

IERC — elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS — PROD. REL: _____ STK. REL. _____ APP. _____ COMPL. _____

ITEM	REFERENCE DES.	QTY.	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
22	C8, 9, 10, 11	4	21044	CAPACITOR, ELECTROLYTIC w/ins. sleeve 230uf @ 400v.	SP-202-766A	MALLORY				
23	C12	1	21068	CAPACITOR, ELECTROLYTIC 90-40-30-30 @ 350v.	TVL 4635.8	SPRAGUE				
24	C13	1	21079	CAPACITOR, ELECTROLYTIC 1000 uf @ 12v.	TVA 1133	SPRAGUE				
25	C4	1	2224-474-20A	CAPACITOR, MET. MYLAR ≅ .47uf @ 400v.	ZD4A474	ELPAC				
26	C5	1	2235-201-5	CAPACITOR, SILVER MICA ≅ 200pf, 500v. 5%	DM-19-201-J	ELMENCO				
27	C6	1	2224-473-10A	CAPACITOR, MYLAR & FOIL ≅ .047uf, 400v. 10%	Type PPW	AJAX				
28	C3	1	2224-474-20A	CAPACITOR, MET. MYLAR .47uf @ 400v. 20%	ZD4A474	ELPAC				
[illegible]	CR3 4	2	38113	DIODE	HI8100	ELECTRONIC DEVICES INC				
30	CR1,2	2	38500	DIODE, RECT. DUAL SEMICONDUCTOR	VR-600	MALLORY				
31	CR7	1	38048	DIODE	A40A	G.E.				
32	[illegible]			[illegible]						
33										
34	R10,11,17,20	4	7300.5-100-5	RESISTOR, CARB. COMP. 10Ω ½W, 5%	EB-1005	ALLEN BRADLEY				
35	R6,7,14,35,36,15	6	7300.5-101-10	RESISTOR, CARB. COMP. 100 ½W. 10%	EB-1011	ALLEN BRADLEY				
36	R9,13,16,23	4	7301-221-10	RESISTOR, CARB. COMP. 220Ω 1W, 10%	GB-2201	ALLEN BRADLEY				
37	R31	1	7300.5-102-10	RESISTOR, CARB. COMP. 1K, ½W, 10%	EB-1021	ALLEN BRADLEY				
38	R3	1	7301-183-5	RESISTOR, CARB. COMP. 18K, 1W, 5%	GB-1835	ALLEN BRADLEY				
39	R4	1	7301-223-5	RESISTOR, CARB. COMP. 22K, 1W, 5%	GB-2235	ALLEN BRADLEY				
40	R5	1	7301-105-5	RESISTOR, CARB. COMP. 1M, 1W, 5%	GB-1055	ALLEN BRADLEY				
41	R27	1	7301-271-10	RESISTOR, CARB. COMP. 270ohms. 1W, 10%	GB-2711	ALLEN BRADLEY				
42	R28,29	2	7302-104-5	RESISTOR, CARB. COMP. 100K, 2W, 5%	HB-1045	ALLEN BRADLEY				

BILL OF MATERIALS

MODEL NO 1160A | TITLE: POWER AMPLIFIER | DWG. A98051C | PAGE 3 OF 4

BY _____ APP. _____

IERC — elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS
PROD. REL. _____ STK. REL. _____
APP. _____ COMPL. _____

ITEM	REFERENCE DES.	QTY.	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
43	R30	1	7343-101	Resistor, Wirewound 100 ohms, 3W.	4392	OHMITE				
44	R26	1	7345-502	Resistor, Wirewound 5K, 5W.	4642	OHMITE				
45	R32	1	7345-752	Resistor, Wirewound 7.5K, 5W.	4649	OHMITE				
46	R34	1	7345-50	Resistor, Wirewound 5 ohms, 5W.	4549	OHMITE				
47	R33	1	7343-200	Resistor, Wirewound 20 ohms, 3W.	4368	OHMITE				
48										
49	R12	1	73749	POTENTIOMETER, LOCKING 1K, 2W, Type AP	CLU-1021	OHMITE				
50	R1	1	73750	POTENTIOMETER, Non-Locking 1K, 2W, Type AB	CU-1021	OHMITE				
51	R2	1	73751	POTENTIOMETER, Non-Locking 25K, 2W,	JAIN056P253AA	ALLEN BRADLEY				
52	R37	1	73721	POTENTIOMETER 25 ohms, 2W.	43C2	CLAROSTAT				
53										
54	V1,2,3,4,5	5	A93500	TUBE, OUTPUT & REG.	A93500	INSTRUMENTATION				
55		8	33000	CHOKE, FERRITE, BEAD TYPE	M315	NAT'L MOLDITE				
56	J1	1	A29025	CONNECTOR, SOCKET PLUG-IN MATE	A29025	INSTRUMENTATION				
57		2	42003	RECEPTACLE (LION) PLUG IN MOUNT. ¼ TURN.	5-295	SOUTHCO.				
58		4	49018	BUMPER RECESSED RUBBER	6259-2	RUBBERCRAFT				
59	TP1,2,3,4	4	51003	JACK, TIP, RED	105-602	JOHNSON				
60	TP5	1	51004	JACK, TIP, BLACK	105-603	JOHNSON				
61		2	49031	HANDLE, 4.56 MTG.	FGA-4	VEMALINE				
62		2	52002	KNOB, ¼" SHAFT, SPUN INSERT	RB900	ROGAN				
63	K1	1	72011	RELAY, 3 PDT. 6 V DC, 5A.	KA14T	POTTER & BRUMFD.				

BILL OF MATERIALS

MODEL NO. 1160A | TITLE: POWER AMPLIFIER | DWG A98051C | PAGE 4 OF 4

BY _____ APP. _____

IERC — elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS — PROD. REL: _____ STK. REL. _____ APP. _____ COMPL. _____

ITEM	REFERENCE DES	QTY	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
64	I1	1	54013	Lamp, Neon, 115v. Red.	BG3-RC-S-ZH-35K	ELDEMA				
65		5	81025	Socket, Tube, Octal Mica filled.	29101	CINCH JONES				
66	CB1	1	89017	CIRCUIT BREAKER, 7.5A	CB-3107B	WOOD ELEC.				
67	S1	1	89006	SWITCH, PUSH BUTTON	903	SWITCHCRAFT				
68	TB1	1	90020	BARRIER STRIP, 6 LUG	6-141Y	CINCH JONES				
69		1	91010	TERMINAL STRIP, 12 LUG	2012	CINCH JONES				
70		1	91016	TERMINAL STRIP, 4 Lug Miniature	4-D1769	ALCON				
71		1	91018	TERMINAL STRIP, 1 Lug Miniature	4-01772	ALCON				
72		2	91021	TERMINAL STRIP, 3 Lug & Grd.	4-1118	ALCON				
73		2	91022	TERMINAL STRIP, 2 Lug & Grd.	4-1059	ALCON				
74		2	91024	TERMINAL STRIP, 2 Lug Miniature	4-01788	ALCON				
75		1	90000	BINDING POST, RED 5-WAY	DF-31RC	SUPERIOR ELEC.				
76		1	90001	BINDING POST, BLK 5-WAY	DF-31BC	SUPERIOR ELEC.				
77		1	90046	BINDING POST, WHT 5-WAY	DF-31WTC	SUPERIOR ELEC.				
78										
79		1	32003	A.C. Line Cord	1835JT	ELECTROCORD				
80		1	27001	Strain Relief Clamp	SR-6P-1	HEYMAN				

BILL OF MATERIALS

MODEL NO. 12AU7

TITLE: DRIVER AMPLIFIER ASSY.

DWG A 97454-1 A PAGE 1 OF 2

BY

APP.

IERC

elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS

PROD. REL: STK. REL.

APP. COMPL.

ITEM	REFERENCE DES.	QTY	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
1		1	C67130-2	PLATE	C67130-2	INSTRUMENTATION				
2										
3	C4,5,2	3	2224-474-20A	CAPACITOR, MET. MYLAR .47nf @ 400 V. 20%	ZDA474	ELPAC				
4	C6,7	2	2224-824-20A	CAPACITOR, MET. MYLAR .82nf @ 400V. 20%	ZDA824	ELPAC				
5	C3	1	2235-241-5	CAPACITOR, SILVER MICA ≅ 240 pf @ 500V. 5%	DM-15-241-J	ELMENCO				
6	C1	1	2226-402-20A	CAPACITOR, MYLAR, ORANGE DROP. ≅ .004nf @ 400V 10%	6PS-D40	SPRAGUE				
7	C9	1	2235-910-5	CAPACITOR, DURA-MICA =91 pf @ 500V. 5%	DM-19-910-J	ELMENCO				
8										
9	R2	1	7300.5-152-10	RESISTOR, CARB. COMP 1.5K. 1/2W. 10%	EB1521	ALLEN BRADLEY				
10	R12,13	2	7300.5-272-10	RESISTOR, CARB. COMP 2.7K. 1/2 W. 10%	EB2721	ALLEN BRADLEY				
11	R6	1	7300.5-472-10	RESISTOR, CARB. COMP. ≅ 4.7K. 1/2 W. 10%	EB4721	ALLEN BRADLEY				
12	R4	1	7300.5-472-10	RESISTOR, CARB. COMP. 4.7K. 1/2W. 10%	EB4721	ALLEN BRADLEY				
13	R5	1	7300.5-103-10	RESISTOR, CARB. COMP. 10K. 1/2W. 10%	EB1031	" "				
14	R9,10,15,19	4	7300.5-105-10	RESISTOR, CARB. COMP. 1M. 1/2W. 10%	EB1051	" "				
15	R7,8	2	7301-273-5	RESISTOR, CARB. COMP. 27K. 1W. 5%	GB2735	" "				
16	R11,14	2	7301-473-5	RESISTOR, CARB. COMP. 47K. 1W. 5%	GB4735	" "				
17	R1	1	7301-683-5	RESISTOR, CARB. COMP. 68K. 1W. 5%	GB6835	" "				
18	R22	1	7301-124-5	RESISTOR, CARB. COMP. 120K. 1W. 5%	GB1245	" "				
19	R23	1	7301-105-5	RESISTOR, CARB. COMP. 1M. 1W. 5%	GB1055	" "				
20	R17	1	7301-224-10	RESISTOR, CARB. COMP. 220K. 1W. 10%	GB2241	" "				
21										

BILL OF MATERIALS

MODEL NO. 12AU7

TITLE: DRIVER AMPLIFIER ASSY.

DWG A97454-1 A PAGE 2 OF 2

BY

APP.

IERC

elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS
PROD. REL. STK. REL.
APP. COMPL.

ITEM	REFERENCE DES.	QTY	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
22	R3	1	7343-101	RESISTOR, WIRE-WOUND AXIAL LEAD, 100Ω 3W, B.D.	2760	OHMITE				
23	R20,21	2	7345-253	RESISTOR, WIRE WOUND RADIAL LEAD, 25K 5W.	4664	OHMITE				
24	R16,18	2	73731	POTENTIOMETER 250K, 1/2W	RV6LAYSA254B	ALLEN BRADLEY				
25										
26	V1,2,3	3	12AU7	TUBE, VACUUM DUAL TRIODE	12AU7	G. E.				
27		3	91016	TERMINAL STRIP 4 PIN & GRD. MIN.	4-01769	ALCON				
28		3	80043	SHIELD, TUBE	TRT6-6020B	I.E.R.C.				
29		3	80044	BASE, TUBE	950	ALCON				
30		3	81014	SOCKET, TUBE, 9 PIN	925 LL-7	ALCON				
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										

BILL OF MATERIALS

MODEL NO.

TITLE: DRIVER AMPLIFIER ASSY.

DWG: A97454-2 PAGE 1 OF 2

BY

APP.

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elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS
PROD. REL: STK. REL.
APP. COMPL.

ITEM	REFERENCE DES.	QTY.	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
1		1	C67130-2	PLATE	C67130-2	INSTRUMENTATION				
2										
3	C8	1	2235-101-5	Capacitor, Silver Mica 100 pf @ 500v. 5%	DM15-101-J	ELMENCO				
4	C4,5,2	3	2224-474-20A	Capacitor, Met.Mylar .47 uf @ 400v. 20%	ZDA474	ELPAC				
5	C6,7	2	2224-824-20A	Capacitor, Met.Mylar .82 uf @ 400v. 20%	ZD4A824	ELPAC				
	C3	1	2235-181-5	Capacitor, Silver Mica ≅180pf @ 500v. 5%	DM-15-181-J	ELMENCO				
7	C1	1	2226-402-20A	Capacitor, Mica, Orange Drop ≅.004 uf @ 600v. 10%	6PS-D40	SPRAGUE				
8	C9	1	2235-910-5	Capacitor, Dura-Mica = 91 pf @ 500v. 5%	DM-19-910-J	ELMENCO				
9										
10	R2	1	7300.5-152-10	Resistor, Carb.Comp. 1.5K, ½W. 10%	EB-1521	ALLEN BRADLEY				
11	R12,13	2	7300.5-272-10	Resistor, Carb.Comp. 2.7K, ½W, 10%	EB-2721	ALLEN BRADLEY				
12	R6	1	7300.5-472-10	Resistor, Carb.Comp. ≅4.7K, ½W, 10%	EB-4721	ALLEN BRADLEY				
13	R4	1	7300.5-472-10	Resistor, Carb.Comp. 4.7K, ½W, 10%	EB-4721	ALLEN BRADLEY				
14	R5	1	7300.5-103-10	Resistor, Carb.Comp. 10K, ½W, 10%	EB-1031	ALLEN BRADLEY				
15	R9,10,15,19	4	7300.5-105-10	Resistor, Carb.Comp. 1M, ½W, 10%	EB-1051	ALLEN BRADLEY				
16	R26	1	7300.5-155-10	Resistor, Carb.Comp. ≅1.5M, ½W, 10%	EB-1551	ALLEN BRADLEY				
17	R7,8	2	7301-273-5	Resistor, Carb.Comp. 27K, 1W, 5%	GB-2735	ALLEN BRADLEY				
18	R11,14	2	7301-473-5	Resistor, Carb.Comp. 47K, 1W, 5%	GB-4735	ALLEN BRADLEY				
19	R1	1	7301-683-5	Resistor, Carb.Comp. 68K, 1W, 5%	GB-6835	ALLEN BRADLEY				
20	R22	1	7301-124-5	Resistor, Carb.Comp. 120K, 1W, 5%	GB-1245	ALLEN BRADLEY				
21	R23	1	7301-105-5	Resistor, Carb.Comp. 1M, 1W, 5%	GB-1055	ALLEN BRADLEY				

BILL OF MATERIALS

MODEL NO.

TITLE: DRIVER AMPLIFIER ASSY.

DWG A97454-2 PAGE 2 OF 2

BY

APP

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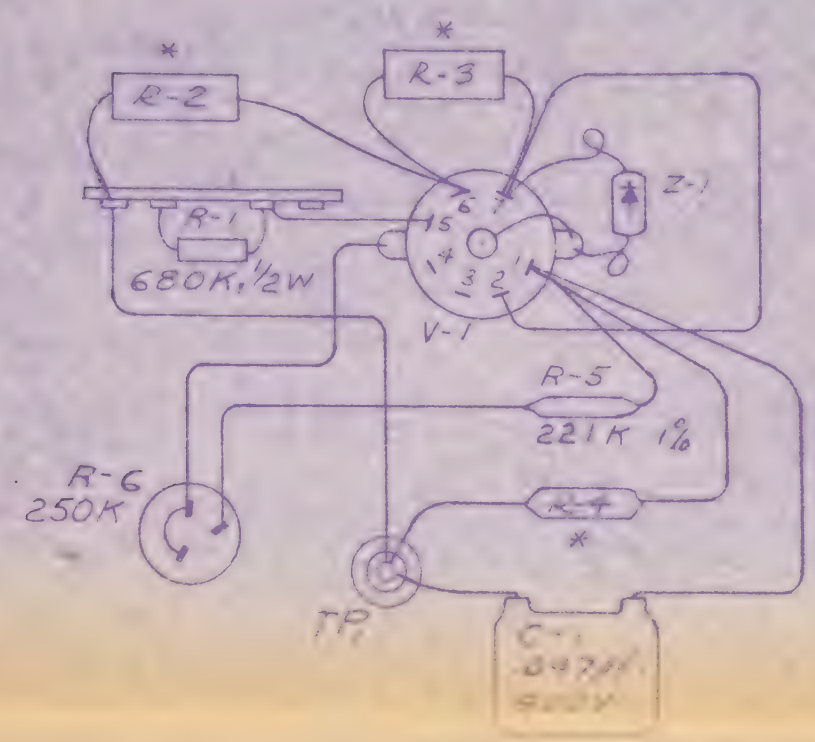
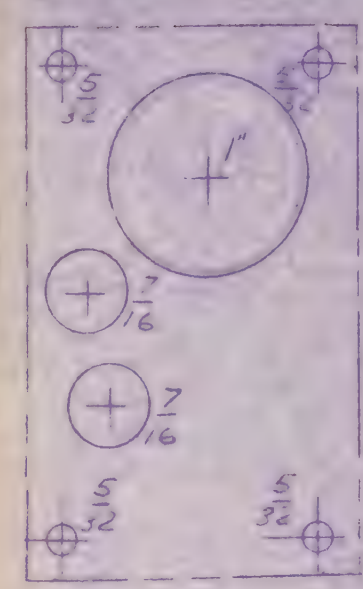
elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP.
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS
PROD. REL: STK. REL.
APP. COMPL.

ITEM	REFERENCE DES.	QTY.	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
22	R17	1	7301-224-10	Resistor, Carb.Comp. 220K, 1W, 10%	GB-2241	ALLEN BRADLEY				
23										
24	R3	1	7343-101	Resistor,W.W. B.D. Axial Lead. 100 3W		OHMITE				
25	R20,21	2	7345-253	Resistor,W.W. B.D. Radial Lead 25K, 5W		OHMITE				
26	R16,18	2	73731	Potentiometer 250K, ½W	RV6LAYSA254B	ALLEN BRADLEY				
27										
28	V1,2,3	3	12AU7	Tube, Vacuum Dual Triode	12AU7	G.E.				
29		3	91016	Terminal Strip, 4 Pin & Grd. Min.	4-01769	ALCON				
30		3	80043	SHIELD, TUBE	TRT6-6020B	IERC				
31		3	80044	BASE, TUBE	950	ALCON				
32		3	81014	SOCKET,TUBE,9PIN	925-LL-7	ALCON				

...INTERNATIONAL ELECTRONIC RESEARCH CORP. claims proprietary and/or patent rights in the ... disclosed hereon. This drawing is issued in confidence for engineering information only and may ... reproduced or used to manufacture anything shown hereon without direct written permission from ... of INTERNATIONAL ELECTRONIC RESEARCH CORP. to the user.





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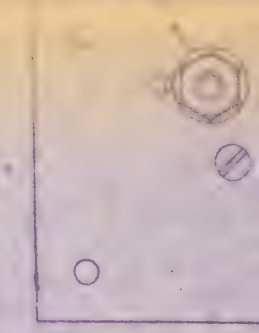
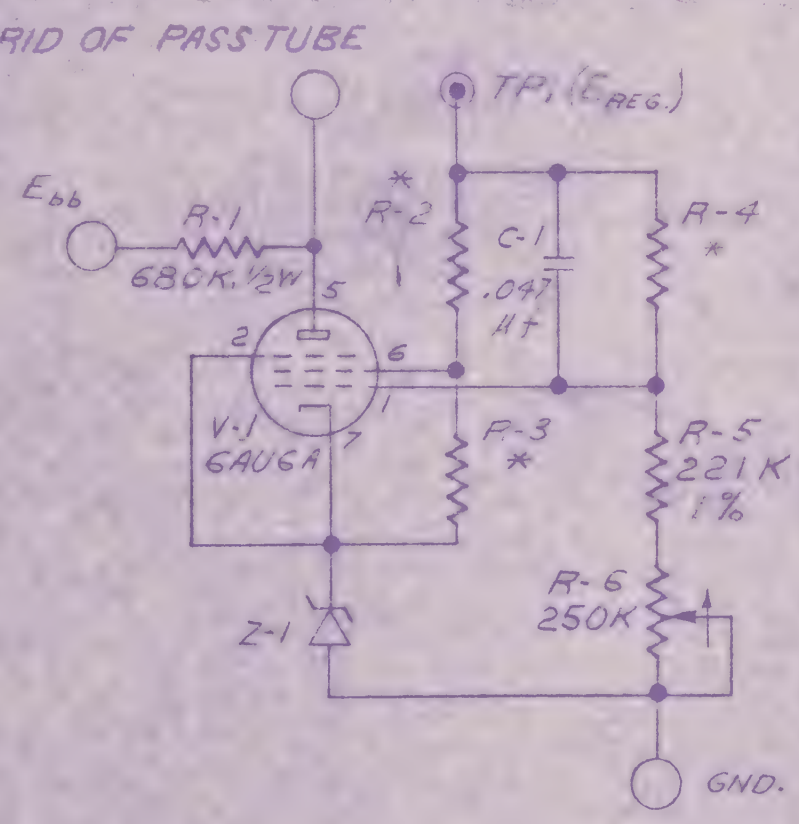
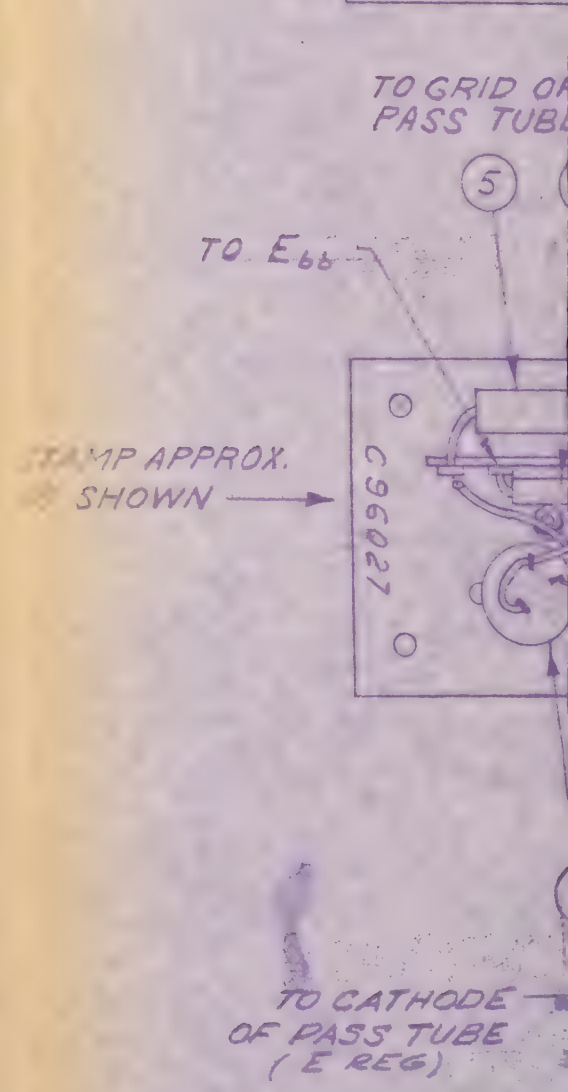


R2 & 3	FOR PART NO. 96027-1 USE 22K, 1W, 10% FOR PART NO. 96027-2 USE 39K, 1W, 10%
R4	FOR PART NO. 96027-1 USE 681K, 1/2W, 1% FOR PART NO 96027-2 USE 1.5M, 1/2W, 1%





2. E_{FIL} = 6.3 V.R.M.S. @ 300 ma.

PASS TUBE	250	300	350	400	E_{bb}
7233 I_b = 100 ma MAX.	350-450	350-500	400-575	450-650	E_b
7581 E_{bb} = 450-550	100 ma	130 ma	160 ma	—	I_b (max)

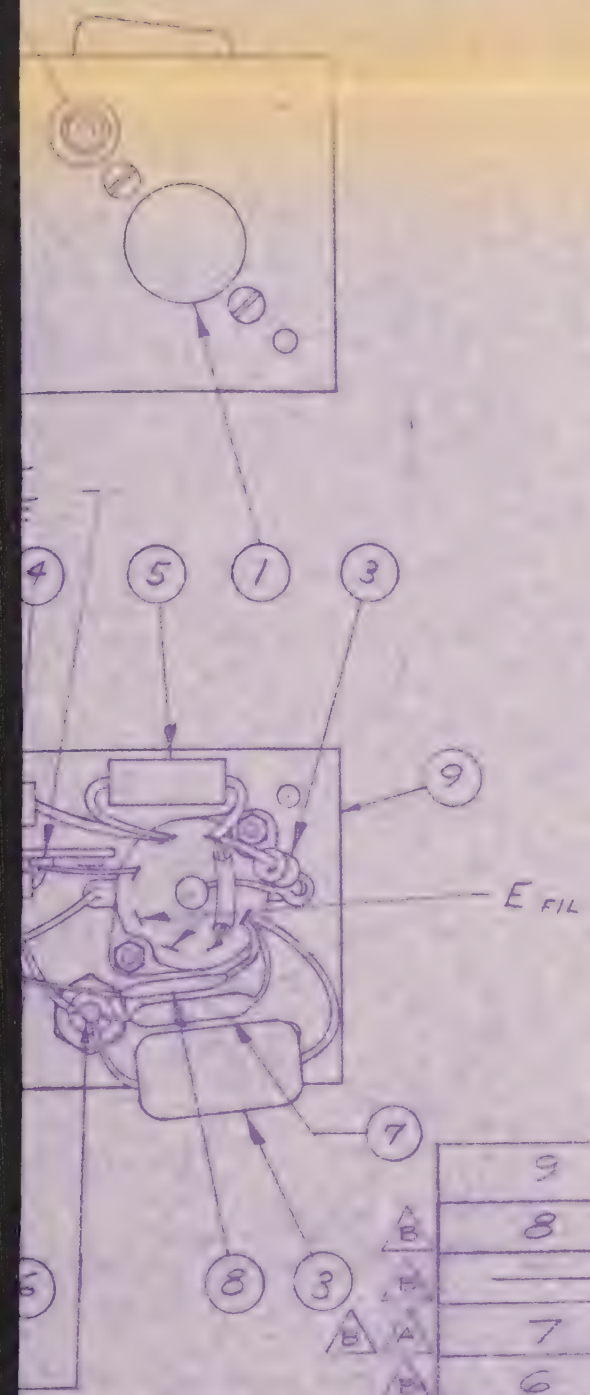
1. TO OPERATE IN CONJUNCTION WITH 7233 OR 7581 PASS TUBE.

NOTES (UNLESS OTHERWISE SPECIFIED) (APPLY TO 96027-1 ONLY)

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	ADDED -1, -2; G J C CN 225	27 DEC 61	[illegible]
B	REVISED RESISTOR & CAPACITOR PART NOS C.L. 319 I.O.P.	1 OCT 62	[illegible]
C	ADDED ITEM 9, PARTS LIST	7-22-65	[illegible]

TEMPLATE

P1 (E REG)



C96027-1/2

C

	ITEM	PART NO.	QTY	DESCRIPTION	REF DES
	9	B67088	1	PLATE, CHASSIS	—
B	8	7310.5-2213-1	1	RESISTOR 221K 1/2W 1%	R-5
B	—	7310.5-6813-1	1	681K 1/2W 1%	R-4
B A	7	7310.5-155-1	1	1.5M 1/2W 1%	R-6
B	6	72731	1	POT, 250K ±20%	R-6
B A	5	7301-393-10	1	39K 1W 10%	R-3
B	—	7301-223-10	2	22K 1W 10%	R-2 R-3
B	4	7300.5-684-10	1	RESISTOR 680K 1/2W 10%	R-1
	3	38026	1	DIODE, ZENER	Z-1
B	2	2224-423-10A	1	CAPACITOR .047μf, 400V	C-1
	1	6AU6A	1	ELECTRON TUBE	V-1
ASSEMBLY PART NO'S.	ITEM 96027-2	ITEM 96027-1			

	DRAWN	DATE
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCE	J G	9-20-61
	CHECKED	DATE
	[illegible]	25 Sep 61
	APPROVED	DATE
	[illegible]	[illegible]
	APPROVED	DATE

TITLE

CONTROL UNIT
D.C.

elin DIVISION
INTERNATIONAL ELECTRONIC RESEARCH CORPORATION
BURBANK, CALIFORNIA U.S.A.

SIZE	DWG NO	REV
C	96027	C

SCALE 1/1

BILL OF MATERIALS

MODEL NO	TITLE: CONTROL UNIT D.C.	DWG: C96027-1 PAGE 2 OF 3
BY	IERC — elin INSTRUMENTS — INTERNATIONAL ELECTRONIC RESEARCH CORP. — 135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA	STATUS — PROD. REL. — STK. REL. — APP. — COMPL.
APP.		

ITEM	REFERENCE DES	QTY	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
1		1	B67088	PLATE, CHASSIS	B67088	IERC				
2										
3	C1	1	2224-473-10A	CAPACITOR, MYLAR .047 uf @ 400v. 10%	.047x400± 10% TPW	AJAX				
4										
5	R4	1	7310.5-6813-1	RESISTOR, DEP.CARBON 681K, ½W. 1%	Type CD ½ MR	TEXAS INSTR.				
6	R5	1	7310.5-2213-1	RESISTOR, DEP.CARBON 221K, ½W. 1%	Type CD ½ MR	TEXAS INSTR.				
7	R2, R3	2	7301-223-10	RESISTOR, CARB.COMP. 22K, 1W, 10%	GB-2231	ALLEN BRADLEY				
8	R1	1	7300.5-684-10	RESISTOR, CARB.COMP. 680K, ½W. 10%	EB-6841	ALLEN BRADLEY				
9	R6	1	73731	RESISTOR,VARIABLE,250K w/mtg.head & lock nut	RV6LAYSA254B	ALLEN BRADLEY				
10										
11	Z1	1	38026	DIODE, ZENER	1D100A	DIODES INC.				
12										
13	V1	1	6AU6A	TUBE, ELECTRON	6AU6A	R.C.A.				
14										
15		1	81015	SOCKET, 7 PIN MICA FILLED with GRD.LUGS,CENTER SADDLE	5251L-61	ALCON				
16		1	80038	SHIELD BASE, 7 PIN	550	ALCON				
17										
18		1	51003	TIP JACK, RED	105-602	JOHNSON				
19										
20		1	91016	TERMINAL STRIP 4 LUG, MIN.	4-01769	ALCON				
21		1	80040	DISSIPATOR, TUBE	[illegible]	IERC				

BILL OF MATERIALS

MODEL NO.

BY

APP.

TITLE: CONTROL UNIT D.C.

IERC

elin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP
135 W. MAGNOLIA BLVD, BURBANK, CALIFORNIA

DWG. C96027-1 PAGE 3 OF 3

STATUS
PROD. REL. STK. REL.
APP. COMPL.

ITEM	REFERENCE DES.	QTY.	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK.	P. O. NO	UNIT PRICE	TOTAL
22		3	78057	Screw Binder H'D 3-48 x 3/16 lg. Nic.Pl.						
23		3	94005	Lockwasher, Int.Tooth #3 CAD.Pl.						
24		3	61025	Hex. Nut, Radio #3-48 Nic.Pl.						
25										
26				Wire #22 AWG. Red 105°C Bunch Tinned 2" lg.						
27				Strip 1/4" each end.						
28										
29				Wire #22 AWG, solid tinned 1½ lg.						

PLUG-IN UNITS SECTION

100 SERIES

PRECISION OSCILLATOR PLUG-IN UNITS

TABLE OF CONTENTS CONTINUED

PLUG-IN UNITS SECTION

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R & C List (Models 111 & 112)	4

SECTION 1 PRECISION OSCILLATOR PLUG-IN UNITS

1.0 INTRODUCTION

THE ELIN OSCILLATOR WHICH FEATURES CONSTANT OUTPUT VOLTAGE UNDER VARYING LINE AND LOAD CONDITIONS HAS BEEN REPACKAGED AS A PLUG-IN UNIT. ADDITIONAL FEATURES ARE VIRTUAL ABSENCE OF HARMONICS, NOISE AND HUM AND A HIGH DEGREE OF FREQUENCY STABILITY. THESE CHARACTERISTICS ARE OBTAINED THROUGH USE OF A HIGH-Q, LC TANK CIRCUIT IN THE FREQUENCY DETERMINING NETWORK AND A UNIQUE RMS SENSITIVE BRIDGE CIRCUIT LOCATED IN THE FEEDBACK LOOP.

WHEN USED WITH ELIN POWER AMPLIFIERS, THE AMPLITUDE REGULATION VERSUS LINE AND DISTORTION SPECIFICATIONS OF THE AMPLIFIER APPLY.

MODEL 111 FIXED FREQUENCY PRECISION OSCILLATOR

FREQUENCY RANGE:	ANY SINGLE FREQUENCY FROM 200 CPS TO 5KC
FREQUENCY ACCURACY:	± 0.1%

MODEL 112 PRECISION OSCILLATOR WITH FREQUENCY STANDARD

FREQUENCY RANGE:	ANY SINGLE FREQUENCY FROM 200 CPS TO 5KC
FREQUENCY STABILITY:	± 2PPM/DAY FROM 0° C TO 50° C AMBIENT
	± 1PPM/DAY @ CONSTANT AMBIENT (25° C)
TUNING RANGE:	± 25 PPM

SECTION 2

2.0 A HIGH Q TOROIDAL TRANSFORMER T-1 WITH C-1 AND C-2 COMPRISE THE FREQUENCY DETERMINING COMPONENTS OF THE OSCILLATOR. FIXED CAPACITOR NETWORK C-2 IS SELECTED TO GIVE THE PROPER OUTPUT FREQUENCY WHEN C-1 IS ADJUSTED TO APPROXIMATELY THE CENTER OF ROTATION. ADJUSTMENT OF C-1 GIVES PRECISE SETTINGS OF FREQUENCY OVER A LIMITED RANGE. FREQUENCY STABILITY OVER A NORMAL LABORATORY AMBIENT TEMPERATURE RANGE IS PROVIDED BY THE USE OF A STABILIZED CORE FOR TOROID T-1 AND THE LOW TEMPERATURE COEFFICIENT OF C-2 AND C-1. THE Q OF TOROID T-1 IS MAINTAINED AT ITS HIGH VALUE BY MEANS OF LARGE AMOUNTS OF NEGATIVE FEEDBACK TO THE INPUT GRID OF V-1.

THE TERTIARY WINDING OF TRANSFORMER T-2 PROVIDES ABOUT 10 VOLTS OF FEEDBACK TO THE RMS BRIDGE CIRCUIT TO COMPENSATE FOR LINE AND LOAD CHANGE. THE RMS SENSITIVE BRIDGE CIRCUIT, EPN 74002-1, IS COMPOSED OF A SPECIAL BIMETALLIC PRECISION RESISTOR AND A SPECIALLY AGED NONLINEAR ELEMENT. THIS BRIDGE CONTINUOUSLY MONITORS THE OUTPUT OF THE OSCILLATOR AND SUPPLIES THE POSITIVE FEEDBACK NECESSARY FOR OSCILLATION. IT PRODUCES TWO SIGNALS WHICH ARE TAKEN OFF INDUCTIVELY. ONE IS PROPORTIONAL TO THE PREDETERMINED VOLTAGE LEVEL AT WHICH THE OSCILLATOR IS TO OPERATE. THE OTHER IS AN ERROR SIGNAL THAT REFLECTS VARYING LINE AND LOAD CONDITIONS AS THEY MAY AFFECT THE OUTPUT.

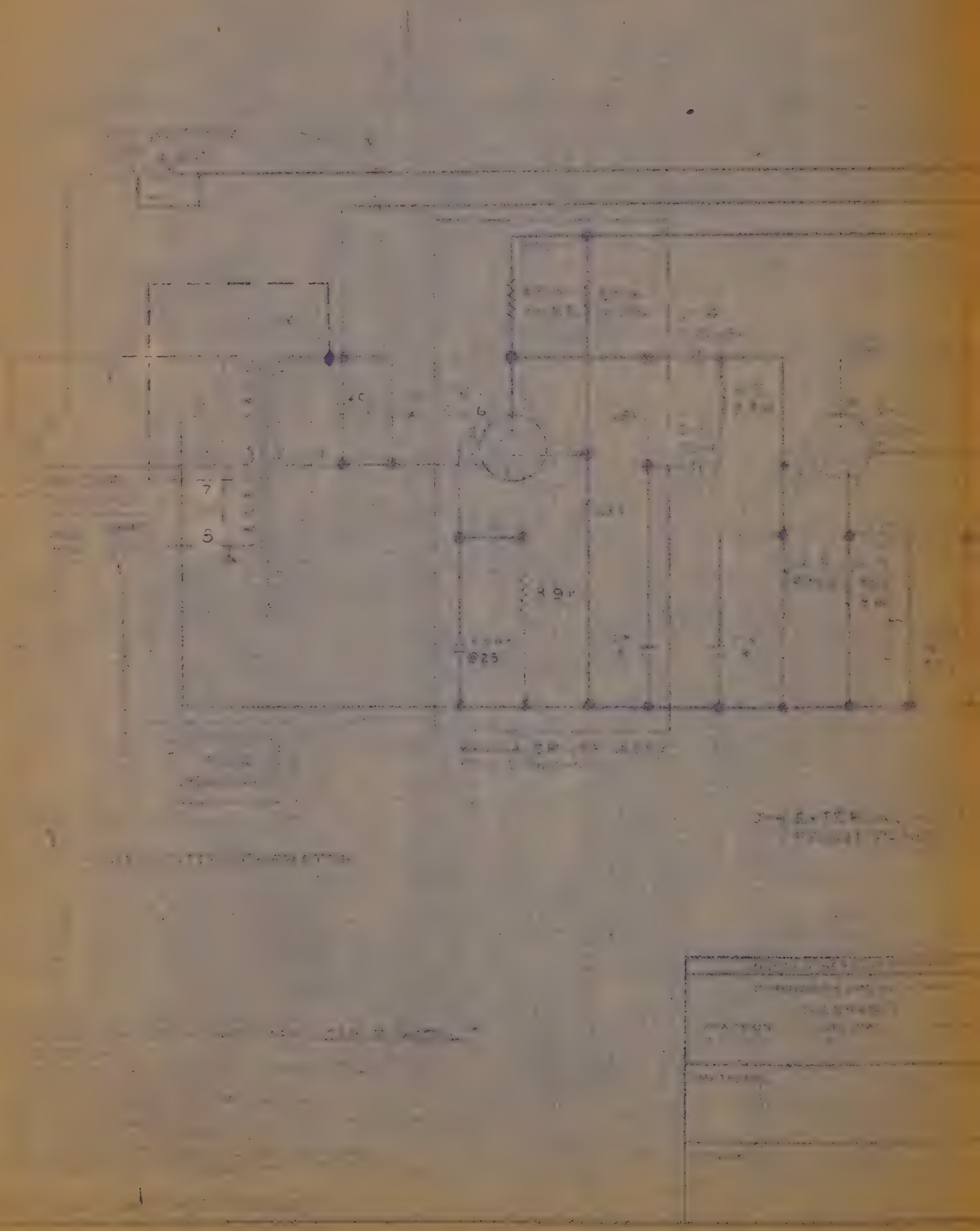
THE NET EFFECT OF THESE SIGNALS APPEARS AS THE INDUCED VOLTAGE AT THE SECONDARY OF THE TOROIDAL TRANSFORMER WHICH IS LOCATED IN THE NEGATIVE FEEDBACK PATH AND TUNED TO THE OPERATING FREQUENCY OF THE OSCILLATOR. POTENTIOMETER R-1 PROVIDES FINE ADJUSTMENT OF THE OUTPUT VOLTAGE.

THE TERTIARY WINDING OF T-2 SUPPLIES A NEGATIVE FEEDBACK SIGNAL WHICH IS SUMMED WITH THE POSITIVE FEEDBACK SIGNAL FROM T-1. THIS COMBINED SIGNAL IS FED INTO THE GRID OF TUBE V-1 WHICH IS THE FIRST STAGE OF A POWER AMPLIFIER. EXTREMELY LOW DISTORTION AND HIGH STABILITY ARE ACHIEVED IN THIS AMPLIFIER THROUGH THE USE OF 50 TO 70 DB OF NEGATIVE FEEDBACK AROUND THE TOTAL AMPLIFIER. A HIGHLY DEVELOPED OUTPUT TRANSFORMER AND SELECTED COMPONENTS FOR INTERNAL COMPENSATION ARE REQUIRED FOR CORRECT OPERATION OF THIS CIRCUIT.

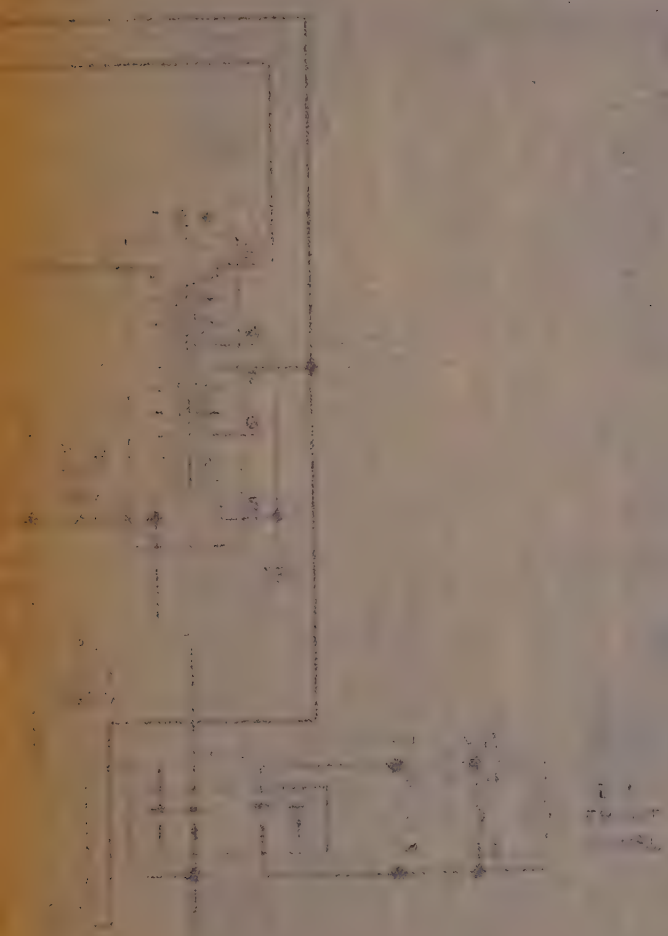
2.1 CALIBRATION

ALLOW APPROXIMATELY TWO HOURS WARM-UP ON STANDARD UNITS BEFORE MAKING ANY CALIBRATION ADJUSTMENTS. FIRST, SET THE FREQUENCY BY MEANS OF C-1. THEN ADJUST THE VOLTAGE BY MEANS OF R-1. A FINAL TOUCH OF C-1 MIGHT BE NECESSARY. ON FREQUENCY STANDARD MODELS, ADJUST C-1 TO THE DESIRED FREQUENCY ± 0.1% WITH S-1 IN THE FREE RUN POSITION BEFORE PLACING THE UNIT IN SYNC.

[illegible] INTERNATIONAL ELECTRONIC RESEARCH CORP. [illegible] This drawing is issued in confidence for [illegible] and is used to manufacture anything shown hereon [illegible] of INTERNATIONAL ELECTRONIC RESEARCH CORP. to the user.



D	—	TO REVERSED TERMINALS 7 & 8 ALL PINS WAS CONNECTED TO PIN 8			



SCHEMATIC

MODELS 111 & 112
PLUG-IN UNITS

elin

INTERNATIONAL ELECTRONIC RESEARCH CORPORATION
BURBANK, CALIFORNIA U.S.A.

S 77203 D

STATUS	BILL OF MATERIALS	MODEL NO. 111 & 112	PAGE 1 OF 3
PRODUCTION RELEASE:	elin division — INTERNATIONAL ELECTRONIC RESEARCH CORP. 135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA	COMPILED BY M.E.W. DATE 8-2-3	PROJECT / JOB NO.
APPROVED BY:	TITLE: PRECISION OSCILLATOR PLUG-IN	COGNIZANT ENGINEER	SCHEMATIC: B77203 C
STOCK RELEASE DATE:			
COMPLETION DATE:			

SYM.	DESCRIPTION	COMMENTS	APPROVED MFR. & MFR. DESIGNATION	QTY.	PART NO.	STOCK	P.O. NO.	INSP. CODE	UNIT PRICE	TOTAL
	TRANSFORMERS									
T-1	TOROID		ELIN DIV.	1	Z			C		
T-2	OUTPUT		"	1	J			C		
	ASSEMBLIES 6AU6A DRIVER		APD	1	C96040			B		
	FREQUENCY STANDARD	MODEL 112 ONLY	"	1	9745-			A		
	TUBE, 6CM6		GE	1	6CM6			A		
	CAPACITORS									
C-1	APC-100 OR APC- 50	BELOW 10KC ABOVE 10KC	HAMMARLUND	1	2300			A		
C-3	60, 30, 30, 150 UF (350V 350V 350V 50V	ELECTROLYTIC	SPRAGUE TVL 4630.4	1	21067			A		
C-4	.001 UF @ 600V		ELPAC MD1176	1	2226-102-20A			A		
C-5	.22 UF "		" MD1036	1	2226-224-208			A		
	RESISTORS									
R-5	10 K 1/2W 10%	CARB. COMP.	ALLEN-BRADLEY	1	7300.5-103-10			A		
R-3	470 K " 10%	"	"	1	7300.5-474-10			A		
R-2	3.9 M " 10%	"	"	1	7300.5-395-10			A		
R-6	300 Ω 5W	WIRE WOUND	OHMITE B.D.	1	7345-301			A		
R-4	350 Ω 5W	"	SPRAGUE B.J.	1	7345-351			A		
R-1	200 Ω 2W POT	VOLT ADJ.	CLAROSTAT 43C2	1	73702			A		

FORM AMDA

STATUS	BILL OF MATERIALS	MODEL NO. 111 & 112	PAGE 2 OF 3
PRODUCTION RELEASE:	ēlin division — INTERNATIONAL ELECTRONIC RESEACH CORP, 135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA	COMPILED BY: DATE M.E.W. 8-2-3	PROJECT / JOB NO.
APPROVED BY			
STOCK RELEASE DATE	TITLE: PRECISION OSCILLATOR PLUG-IN	COGNIZANT ENGINEER	SCHEMATIC B77203 C
COMPLETION DATE			

SYM	DESCRIPTION	COMMENTS	APPROVED MFR. & MFR. DESIGNATION	QTY.	PART NO.	STOCK	P.O. NO.	INSP. CODE	UNIT PRICE	TOTAL
	MISCELLANEOUS									
P-3	PLUG, 8-PIN		ELCO VARICON RM11020-4-1414-1P	1	29024			A		
	STUD, FRONT PANEL	FITS TO RECEP. EPN 42003	SOUTHCO S-K-360	2	42004			A		
J-4	JACK (PHONE)	EXT. INPUT	SWITCHCRAFT [illegible]	1	51007			A		
I-1	LAMP, PILOT	ON-OFF 11-12V	ELDEMA BES-CC-8-170S	1	54008			A		
	BRIDGE		ELIN DIV.	1	74002-3			C		
	SHIELD, TUBE	OR 6CM6	LERC	1	80042			A		
	BASE, TUBE	"	ALCON 950	1	[illegible]			A		
	SOCKET, TUBE		ALCON	2	81004			A		
	GROMMET, RUBBER	1/4" I.D.	HERMAN H. SMITH #608 [illegible]	1				A		
	PLUG, SNAP, FOR 1/8" DIAM HOLE	STEEL, NI. PL.		1				A		

BILL OF MATERIALS

MODEL NO. B77203 C

TITLE: PRECISION OSCILLATOR PLUG-IN

DWG 111 & 112 PAGE 3 OF 3

BY

APP.

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ēlin INSTRUMENTS
INTERNATIONAL ELECTRONIC RESEARCH CORP
135 W. MAGNOLIA BLVD., BURBANK, CALIFORNIA

STATUS
PROD. REL. STK. REL.
APP. COMPL.

ITEM	REFERENCE DES	QTY	ELIN PART NO.	DESCRIPTION	MFG. PART NO.	MFG. OR CODE NO.	STK	P. O. NO	UNIT PRICE	TOTAL
		1	C11161	Panel, Front	C11161	ēlin				
		1	A16094	Bracket	A16094	ēlin				
		1	C25631	Chassis	C25631	ēlin				
		1	B34028-3	Cover	B34028-3	ēlin				
		2	C67092	Plate, Side	C67092	ēlin				
		1	C67093	Plate, Rear	C67093	ēlin				

ONE YEAR WARRANTY

CALIFORNIA INSTRUMENTS CORPORATION warrants each instrument manufactured by them to be free from defects in material and workmanship for a period of one year from the date of shipment to the original purchaser. Excepted from this warranty are tubes, fuses, and batteries which carry the warranty of their original manufacturer where applicable. CALIFORNIA INSTRUMENTS CORPORATION will service, replace, or adjust any defective part or parts, free of charge, when the instrument is returned to the Company freight prepaid, and when examination reveals that the fault has not occurred because of misuse or abnormal conditions of operation. Equipment repaired beyond the effective date of warranty or when abnormal usage has occurred will be charged at applicable rates. CALICO will submit an estimate for such charges before commencing repair if so requested.

PROCEDURE FOR SERVICE

If a fault develops, notify CALICO or its local representative, giving full details of the difficulty, and including the model number and serial number. On receipt of this information, service data or shipping instructions will be furnished. If shipment is indicated, forward the instrument, freight prepaid, to the authorized repair station indicated in the instruction. If requested, an estimate of the charges will be made before the work begins, provided the instrument is not covered by the warranty.

DAMAGE IN TRANSIT

The instrument should be tested as soon as it is received. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to us. CALICO will advise the disposition to be made of the equipment and arrange for repair or replacement. Please include model number and serial number when referring to the instrument.

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